absolute moisture is less on the ground than a few feet above it. The chief results obtained by Dr. Rubenson during the summer of 1871, by a method of observation differing from that of Dr. Hamberg, may be summed up as follows:—Before the fall of dew the absolute moisture continues to increase and is greatest on the ground, diminishing with height. As soon as dew begins to fall, moisture decreases on the surface of the ground, and this decrease keeps pace with the decrease of temperature. The decrease of moisture extends upwards rather rapidly, and can be detected at four feet just after the first deposition of dew. On the ground the decrease per hour amounts to a maximum of about 0·73 mm., while half a foot above it the decrease only reaches 0·65 mm., which is less than one corresponding to the lowering of temperature. The higher the instrument the later does the decrease of moisture show itself, and the less the change per hour. It appears that owing to a fall of temperature on the ground, the air immediately above it becomes saturated, dew falls, and temperature and moisture diminish. At a certain point, owing either to diffusion or a descending current, fresh vapour supplies the place of that condensed as dew, and part of the loss of each stratum is successively made up by the moister stratum above it, but not the whole, for the diminution continues in all the strata. Time being required for the propagation of the decrease upwards, the lowest stratum loses more of its moisture than any of the strata above it.

Zeitschrift für Wissenschaftliche Zoologie, 1875. 2nd Supplement.—This part contains a memoir by Oscar Schmidt, on the embryology of calcareous sponges, in which Haeckel's observations and conclusions are attacked, and his Gastræa theory is destroyed, as far as calcareous sponges are concerned. Unfortunately, at a critical point Oscar Schmidt failed to follow his embryos, and the real purport of his observations remained uncertain until the publication of Schulze's researches hereafter mentioned.—Dr. William Marshall contributes a long memoir on the hexactinellid sponges, figuring and describing new species, with their characteristic spicula. His most interesting new form is one in which the central cavities of the spicula coalescing to form the meshes of the skeleton become perfectly continuous by their protoplasmic contents.

The 3rd Supplement (1875) commences with F. E. Schulze's memoir above referred to, on the structure and development of *Sycandra raphanus*. His beautiful figures give the various stages of segmentation, and the arrangement of the segmentation spheres into groups of different sizes, one set of these giving rise to the invagination by which the Gastrula form is constituted. This sponge is now accepted by Haeckel as exemplifying his Amphiblastic type, while other calcareous sponges form archiblastic embryos, in which the segmentation spheres remain similar to one another until after the Gastrula is formed.—August Weissmann contributes a philosophical paper on the transformation of the Axolotl into Amblystomas. He believes that this transformation is to be regarded as a retrogression, and that the present Axolotl represents a former Amblystoma whose structure has been modified by changed conditions of life.—Prof. Nitsche continues his valuable memoirs on the Bryozoa, the present instalment being devoted to the process of gemmation. He shows that all the structures in the new zooid are produced from the ectoderm of the parent, and insists on the important morphological consequences of this fact, while deprecating the precise schemes of embryogeny and phylogeny now so much in vogue.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 11.—On Simultaneous Barometric Variations in India, by J. A. Broun, F.R.S.—After Pascal showed that the mercury in the barometer tube stands lower at the top than at the foot of a mountain because the mass of air above the barometer is less in the former than in the latter case, it was a natural conclusion that the variations in the height of the mercury observed with a stationary barometer are due to the same cause. Various hypotheses have been proposed to explain how the aërial mass is increased or diminished, none of which, however, can satisfy the facts now known, being either insufficient or untrue. The author, after referring to the latest of these hypotheses, gives results which he has deduced from observations made at three stations in India; namely, at Simla, 7,000 feet above the level of the sea, on a spur of the Himalayas, at Madras, and at Singapore, near the sea-level, the last being 2,700 miles from the first, and 1,800 miles from the second station.

When the daily mean height of the barometer is taken, a large movement is found occupying nearly twenty-six days, a movement attributed by the author to the sun's rotation on his axis; but it is the smaller oscillations of the daily mean atmospheric pressure, the secondary maxima and minima, which are especially examined. The present discussion has been limited to three months, during which there were eighteen of these maxima and minima. The author finds that the mean interval between the times of maximum pressure at any two stations is less than seventeen hours, and between the times of minimum pressure less than ten hours. In four out of eight cases of minima the lowest pressure was attained at all the three stations within six hours. The results of these comparisons is shown to extend even to St. Helena.

It was pointed out that though in general maxima and minima happened at the three stations near the same hour, there were one or two marked exceptions to the rule; one of these, a fall in the height of the mercury of three-tenths of an inch within thirty-six hours, at Simla, was not perceived at any of the other stations. This, the greatest of all the disturbances of atmospheric equilibrium during the period examined, was shown to be connected with a great thunderstorm at Simla (not felt at the other places), and was thus due to a local cause, while the other variations, some of about one-thirtieth the amount of that just mentioned, happened nearly simultaneously over an area of at least a million square miles.

The author suggests that another cause is required to explain these facts than variations of mass through thermic or other actions, the whole climatic conditions being different at the various stations; in other words, *that the attraction of gravitation is not the only attractive force concerned in the variations of atmospheric pressure*.

Linnean Society, May 24.—Annual General Meeting.—Prof. Allman, F.R.S., president, in the chair.—There were presented by Mrs. J. J. Bennett, and a vote of thanks accorded, three medals, memorials of Linnæus—one of silver, struck in 1746, given by Linnæus to Haller in exchange for his portrait; one of gold, dated 1747, struck at the expense of Count Tessin; and a large silver one, designed by Lynberger, struck by command of the King of Sweden in commemoration of the death of Linnæus, Jan. 10, 1778.—Mr. J. Gwyn Jeffreys, treasurer, read his statement of the accounts, &c., of the Society for the year 1875. These showed its financial position to be very favourable, and, indeed, prosperous. The increase in the number of Fellows was very marked, and everything augured the Society's retaining their well-earned reputation and usefulness as a scientific body.—The President then delivered his anniversary address, choosing as a topic the department of biology, treating of those remarkable forms, the border-land between vegetable and animal life. He began by allusion to De Bary's researches on Myxomycetes and its curious transformations; then referred in detail to Cienkowski's remarkable observations on Vampyrella and the marine sarcodous organisms, Labyrinthulæ. Dr. Archer's Chlamydomyxa, Haeckel's Myxastrum, and Magosphaerica, were each passed in review, and a comparison of all these forms entered into, with their peculiar phases and relations to each other. He observed that in them protoplasm was reduced to its simplest nature, evincing what might be considered vegetative or animal life, according to stage, &c. He summed up by regarding life as a property of protoplasm, but very different from conscience and will, or indeed any of the psychological phenomena. The following Fellows were elected into the Council:—J. G. Baker, Dr. W. P. Carpenter, Henry Lee, Prof. W. K. Parker, and S. J. A. Salter, M.B., in the room of the subjoined, who retired: W. T. T. Dyer, J. E. Harting, W. P. Hiern, M.B., Dr. J. D. Hooker, C.B., and J. J. Weir.

Chemical Society, May 18.—Prof. Abel, F.R.S., president, in the chair.—A paper on hemine hematine and a phosphorised substance contained in blood corpuscles, by Dr. J. L. Thudichum and Mr. C. T. Kingzett, was read by the latter.—Prof. W. N. Hartley then made a communication on the natural carbon dioxide from various sources, being a continuation and extension of his former paper on the presence of liquid carbonic anhydride in the cavities of quartz and other minerals.—Mr Kingzett subsequently read a note on some trials of Frankland and Armstrong's combustion process *in vacuo*, by Dr. Thudichum and himself.—Mr. T. Fairley gave a short account of three papers on peroxides, in which he described various reactions with hydrogen peroxide, and also the preparation of sodium and uranium peroxides, on chromic and perchromic acids, and on the estimation of nitrogen.—The Secretary read a paper, by Prof. J. W. Mallet, on aluminium nitride and the action of aluminium on sodium carbonate at a high temperature. The nitride forms small crystalline particles of a yellow colour.—Lastly, Mr. E. Neison gave a short account of a process for the estimation of mercury.

Royal Astronomical Society, May 12.—Mr. W. Huggins, president, in the chair.—The Rev. Frederick Howlett presented to the Society five volumes of sunspot drawings made between the years 1859 and 1874. They contain several drawings of sunspots on a large scale, some of which have already been figured in the pages of the *Monthly Notices*, and other places. A letter was read from Mr. Birmingham informing the Society that Dr. Schmidt's great lunar map of six French feet diameter will soon be issued by the Prussian Government. It has been the labour of thirty-four years, and contains 34,000 craters besides rills and other objects.—A paper by Mr. Dunkin was read on the conjunction of Venus with λ Geminorum, on August 18, 1876, when there will be an excellent opportunity for making micrometrical measures of the planet's parallax with respect to the star. Its nearest approach will be seen from stations in North and South America a little before sunrise.—A paper by Mr. Hind was read on the transit of the great comet of 1819 across the sun's disc. The transit happened on its approach to perihelion, and the comet was not observed until some days afterwards, when it was receding from the sun. After a few weeks Olbers calculated the elements of its orbit, and announced the fact that on the previous 26th of June it must have passed at its ascending node between the earth and sun. Some five years afterwards Pastorff wrote to the Baron de Zach to inform him that he had seen the comet upon the sun's disc, and had, upon the day of its transit, made a drawing of it and a measure of its distance from the sun's limb. He describes it as a nebulous body 6′ in diameter with a bright centre. His original drawing is preserved in the library of the Astronomical Society. Mr. Hind has carefully recalculated the elements of the comet's orbit, and has found that at the time mentioned by Pastorff the comet must have appeared much nearer to the sun's centre than the position indicated by Pastorff. Canon Stark of Augsburg, also published an account of a nebulous body seen upon the sun's disc at 7h. 5m. on the morning of June 26. The measures given by him of the position of the black spot do not agree with the position calculated by Mr. Hind, although there is less discrepancy between them and the calculated position than there is in the case of Pastorff's observation. Mr. Hind is disposed to think that neither Stark's nor Pastorff's observations are to be depended upon.—Mr. Christie read a note on the displacement of lines in the spectra of stars, from which it appeared that the discrepancies between the results of his observations and those of Mr. Huggins only amounted in the case of most of the stars which had been given by him to some three or four miles per second. The meeting adjourned till June 9.

Geological Society, May 24.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—The following communications were read:—"On the old glaciers of the northern slope of the Swiss Alps," by Prof. Alphonse Favre. The author said that in existing glaciers two parts may be recognised,—an upper one, the reservoir or feeding glacier, and a lower one, the flowing glacier. Applying this division to the old glaciers, it appears that in the glaciers of the Rhone and Rhine the flowing glacier which occupied the plain had a surface nearly equal to that of the feeding glacier which was situated in the mountains. He showed (1) that the Rhone glacier passed over several of the chains of the Jura, and that the ice covering these, far from being an obstacle to the extension of the glaciers of the Alps, actually reinforced them, and served them as *relays*, the glaciers of the Jura having carried far on the Alpine erratic blocks; (2) that the slopes of the upper surface were variable, and were null, or nearly so, over considerable spaces. During their greatest extension the Swiss glaciers came in contact with those of central France near Lyons; they united with those of the Jura, the Black Forest, and the Austrian and Italian Alps; they stretched from the plain of the Po to that of the Danube; and further, for distances of 50 or 100 kilometres they nearly approached horizontality. Hence they resembled the glaciers of the interior of Greenland and Spitzbergen, so far as can be judged from the descriptions.—Evidences of Theriodonts in Permian deposits elsewhere than in South Africa, by Prof. R. Owen, F.R.S. In this paper the author noticed some described reptilia which he believes to belong to his order Theriodontia. The genus *Eurosaurus* was founded in 1842 by Fischer von Waldheim upon some fragments of bone, including a humerus with a broad proximal end as in Kutorga's *Orthopus*; and Fischer also noticed a humerus showing characters like those of Kutorga's *Brithopus*, from the same locality as the portion of a jaw described under the name of *Rhopalodon Wangenheimii*, Fischer. In 1858, H. von Meyer described a skull from the Permian of the Oural, under the name of *Mecosaurus uraliensis*, as a Labyrinthodont; and Eichwald referred this genus, with Kutorga's *Brithopus* and *Orthopus*, to Fischer's *Eurosaurus*. The author regarded *Mecosaurus* as truly Labyrinthodont; whilst the Permian forms constituting Kutorga's genus were referred to the Theriodont order. From the same locality as the above Kutorga describes *Syodon biarmicum* as probably a Pachyderm. Its teeth resemble those of *Cynodraco*. Eichwald's *Deuterosaurus biarmicus* is founded upon the fore part of both upper and lower jaws of a reptile, containing teeth with denticulate or crenulate trenchant borders, the canines being large, especially in the upper jaw. *Deuterosaurus* closely resembles *Cynodraco*, and still more the *Lycosaurus* of the Karoo beds of the Sneewberg range. All the above are from the Permian beds of the Oural, and the author regards them as furnishing important evidence of the Palæozoic age of the Karoo series, in which the Theriodont reptiles are best represented. The author further noticed a Theriodont allied to *Lycosaurus* from a red sandstone, probably of Permian age, in Prince Edward Island. The remains include the left maxillary, premaxillary, and nasal bones; the teeth, implanted in distinct sockets, have sub-compressed, re-curved, conical, pointed crowns, with minutely crenulated borders. This fossil has been described by Dr. Leidy under the name of *Bathygnathus borealis*. Thus, supposing the affinities of the fossils from the Oural and Prince Edward Island to be correctly determined, the reptilia distinguished by mammalian characters are shown to have had a very wide range. Further, the author thinks that the Theriodont reptiles of the Bristol Dolomitic conglomerate may also prove to constitute a family in the Theriodontic order.

Physical Society, May 27.—Prof. Gladstone, vice-president, in the chair.—The following candidates were elected members of the Society:—Herbert Taylor, Rogers Field, and Channell Law.—Mr. W. Ackroyd read a paper on selective absorption. Two typical experiments were shown upon which a division of selective absorption may be based. In the first, light is transmitted through bichromate of potash at the normal temperature and again at about 200° C.; and the spectrum of the transmitted light is examined. The widening of the absorption-bands which takes place at the higher temperature is traced to structural alterations. In the second experiment light is sent through two thicknesses of the same coloured solution, as, for example, sulphate of copper, and in the greater thickness the absorption-band has widened out, but this is plainly not owing to any structural alteration. That in the first experiment he proposes to term *structural*, and that in the second *transverse* absorption, and he considers that these two kinds have not hitherto been sufficiently distinguished. Certain colour relations which exist among anhydrous binary compounds led the author to the conclusion that the width of a structural absorption-band bears a direct relation to interatomic distance. The necessity for separating high temperature spectra from low was shown, and the bearing of the subject on the study of organic colouring matters briefly alluded to.—The Secretary then read a communication from the Rev. R. Abbay, on certain remarkable atmospheric phenomena in Ceylon. The most striking of these is witnessed from the summit of Adam's Peak, which is a mountain rising extremely abruptly from the low country to an elevation of 7,200 feet above the sea. The phenomenon referred to is seen at sunrise, and consists *apparently* of an elongated shadow of the mountain projecting westward to a distance of about seventy miles. As the sun rises higher it rapidly approaches the mountain and appears at the same time to rise before the observer in the form of a gigantic pyramid of shadow. Distant objects may be seen through it, so that it is not really a shadow on the land, but a veil of darkness between the peak and the low country. It continues to rapidly approach and rise until it seems to fall back upon the observer, like a ladder which has been reared beyond the vertical, and the next instant it is gone. Mr. Abbay suggests the following explanation of the phenomenon:—The average temperature at night in the low country during the dry season is between 70° and 80° F. and that at the summit of the peak is 30° or 40° F. ; consequently the low strata of air are much the less dense, and an almost horizontal ray of light passing over the summit must be refracted upwards and suffer total internal reflexion, as in ordinary mirage. On this supposition the veil must become more and more vertical, as the rays fall less horizontally, and this will continue until they reach the critical angle, when total internal reflexion ceases and it suddenly disappears. Its apparent tilting over on the spectator is probably an illusion, produced by the rapid approach and the rising of the dark veil without any gradual disappearance which can be watched and estimated. It will be evident that the illumination of the innumerable particles floating in the atmosphere causes the aerial shadow to be visible by contrast. Another interesting phenomenon visible in the mountain districts admits of an equally simple explanation. At times broad beams apparently of bluish light may be seen extending from the zenith downwards, converging as they approach the horizon. The spaces between them have the ordinary illumination of the rest of the sky. If we suppose, as is frequently the case, that the lower strata of air are *colder* than the upper, the reflexion spoken of in the case of Adam's Peak will be downwards instead of upwards. If several isolated masses of clouds partially obscure the sun, we may have several corresponding inverted veils of darkness like blue rays in the sky all apparently converging towards the same point below the horizon. This latter phenomenon is called by the natives "Buddha's Rays."—Prof. Dr. Forel of Morges, Switzerland, then gave, in French, an account of some interesting observations which he has recently made on the periodic waves which take place on the Swiss lakes and are there called "Seiches." It was long since observed that the waters of most of these lakes are subject to a more or less regular rise and fall, which at times have been found to be as much as one or two metres. M. Forel has studied this phenomenon in nine different lakes, and finds that it varies with the length and depth of the lake and that the waves are in every way analogous to those already studied by Prof. Guthrie in artificial troughs, and follow the laws which he has deduced from his experiments. Most of the observations in Switzerland were made on the lake of Geneva, but that of Neuchâtel was found to be best fitted for the study of the subject, possessing as it does an extremely regular geometric form. The apparatus he employed was very sensitive to the motion of the water, being capable of registering the waves caused by a steamboat half an hour after it had passed, and five minutes before its arrival, and was so constructed as to eliminate the effect of common waves, and to register the motion side by side with a record of the state of the barometer, on paper kept in continuous motion. While he found the duration of waves to be ten minutes at Morges it was seventy minutes at Geneva, and this is explained by the narrowness of the neck of the lake at the latter place. This period he proved to be independent of the amplitude, and to be least in the shortest lakes. For shallow lakes the period is lengthened and his observations show that the period is a function of the length and depth and that longitudinal and transverse waves may coexist, just as Prof. Guthrie has shown to be the case in troughs.

STOCKHOLM

Academy of Sciences, March 12.—Herr Rubenson communicated a paper entitled "Monthly and yearly averages of Temperature at the State Meteorological Stations during the Years 1859–1872."—Herr Smitt gave an account of a visit paid by Herr P. Olsson, assisted by a grant from the Academy, to Norrland for zoological research.—Herr Th. M. Fries gave an account of two reports made to the Academy—one by Docent Berggren, who had gone to New Zealand for the purpose of studying its flora, and the other by Dr. Hellbom, who had made a lichenological visit to Norrland.—The following papers were communicated :—On the influence of inequalities with long period on the expression for the absolute perturbations of periodic comets, by Herr Gyldén.—Narrative of an expedition to Novaya Zemlya and the mouth of the Jenesei in 1875, with map, by Prof. Nordenskjöld.—On the simultaneous covariants of the fourth order and fourth class of two conic sections, by Prof. Björling.—On sulphonaphtholid, by Prof. Cleve.—On the action of pentachloride of phosphorus on β naphthol, by Prof. Cleve and Candidate Julin-Dannfelt.—On the estimation of nickel in nickeliferous magnetic pyrites, by Herr Ekelund.—Contributions to the knowledge of the development of Rajæ, by Intendent Malm.—Contributions to the Orthopter-fauna of South Africa, by Prof. Stål.

PARIS

Academy of Sciences, May 29.—Vice-Admiral Paris in the chair.—The following papers were read :—On the atomic constitution of bodies, by M. de Saint-Venant. There is nothing contradictory in regarding atoms as material points having all the properties of visible and tangible bodies, less extension.—New remarks on the real existence of a matter formed of isolated atoms comparable to material points, by M. Berthelot. He gives reasons for withholding assent to MM. Kundt and Warburg's view.—On the salts formed by peroxide of manganese, by M. Frémy.—Observations on a basking shark recently caught at Concarneau, by MM. Gervais. This species (*Squalus maximus*) is found but rarely in temperate waters. It has a number of flexible, elastic filaments (of osseous nature) attached to the branchiæ ; these sift the water, retaining the small animals as food.—Examination of the possible mechanical action of light. Study of the radioscope of Mr. Crookes, by M. Ledieu. The author's theory (implying a special action of polarised light) was submitted to the test of experiment by M. Fizeau, but with negative results. Further experiments are promised.—The Caucasus and its mineral waters, by M. François.—Intensity of gravity in the island of St. Paul, by M. Cazin. The apparent acceleration of gravity there exceeds the theoretical acceleration by $\frac{1}{1000}$ of its value. May not this affect astronomical observations ?—On the radiometer of Mr. Crookes, by M. de Fonvielle. He describes experiments, whence he infers an impulsive action of light. M. Fizeau says that if a bundle of solar rays fall on the instrument, limited by a screen so that they strike only the polished surfaces, the rotation is such that each vane comes to meet the rays instead of escaping from them, as would be the case if the light had impulsive force.—On the Phylloxeras of the leaves of the French vine, by M. Delachanal.—On the laws of matter, by M. de Marsilly.—On a compressed air filter for water, by MM. Chanoit and Midoz.—On the transformation of elliptic functions, by M. Laguerre.—On the development in series of the functions Al(x), by M. Joubert.—On the charge taken by the disc of the electrophorus, by M. Douliot. He describes an arrangement by which he verified the theoretical conclusion that the charge of the disc is proportioned to its radius.—Theory of spectra ; observations on Mr. Lockyer's last communication, by M. Lecoq de Boisbaudran. All spectral lines change in relative intensity when the temperature is raised ; Mr. Lockyer's theory would imply that each element is decomposed into as many more simple substances as its spectrum has lines. Considering the immense number of lines in certain spectra, such a view seems little probable.—On the constitution of prophylenic monochlorhydrines, and the law of addition of hypochlorous acid, by M. Henry.—On a quinoacetate of calcium, by M. Gundelach.—Variations of the electric state of the muscles in voluntary contraction and artificial tetanus, studied with the aid of the galvanoscopic limb, by MM. Morat and Toussaint.—Anaesthesia by the method of intravenous injections of chloral ; amputation of the thigh ; absolute insensibility ; consecutive sleep for six hours ; cure without any accident ; by M. Oré.—On frauds met with in the points of lightning conductors, by M. Francisque Michel.

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